

APPENDIX C

HOW WE CAN GROW SMARTER

LAND COVER CHANGE PROBLEM:

DATA COLLECTION

Intermediate-Advanced Level

Purpose

To request and collect the data necessary to complete the land cover change protocol.

Overview

Using the know sources for aerial photography and topographic maps, students will locate the area to be studied (the entire 512 x 512 pixel landsat TM image), research all the various sources to find out the coverage and times, and finally order the proper material that are necessary to complete the project. Some images require much more work to obtain, specifically the older aerial photographs from around 1958 and earlier. To order these photographs much more lead time is required, however, they are very useful to observe

the large time scale changes that have occurred. Landsat satellite coverage only extends as far back as 1972. The oldest aerial photographs for most areas nationally date back to the 1930's.

Time

1-2 class periods to gather the data.

Time out of class can be used for the data analysis.

Additional time will be necessary for the advanced level search and ordering of aerial photographs.

Level

Intermediate and Advanced

Key Concepts

Research

Communication

Time Management

Budget Management

Skills

Identifying local data resources

Managing both time and money

Collecting data

Integrating information

Analyzing data

Interpreting data to make a decision

Drawing conclusions

Reading and map interpretation

Using computers and the internet/world wide web

Materials and Tools

Internet Access
Paper
Telephone
Worksheet

Preparation

Determine the amount of the budget for this project.

Copy the ***Collection Information Worksheet*** ([link](#)).

Make sure Internet connection is working and the bookmarks are created.

Prerequisites

If your school is not currently a GLOBE school, meaning that your school has a teacher that has been GLOBE trained and received their Landsat TM image file and picture in the mail, then follow the link to a GLOBE page on how to join GLOBE

<http://www.globe.gov/> or to GLOBE teacher training

<http://www.globe.gov/fsl/workshop/registration.pl?lang=en&nav=1>). Complete measurements for at least one GLOBE Natural Cover Quantitative or Qualitative Land Cover Sample Site. The Land Cover Mapping and Accuracy Assessment Process should also be completed prior to the beginning of the Land Cover Change Detection protocol.

What to do and How to Do It

This part of the project is quite simple and the web forms should make the data request for information and collection process fairly easy and hassle-free. Most of the sources used during this project are national in scope and all schools should have significant coverage. However, there are some inconsistencies that do exist, so each site will have to do some customizing with regard to their own data collection.

Additionally, there are numerous sources for other non-national/local coverage, which are excellent. These sources offer much more specific information and scale of images or maps which can be very helpful. Also, the people who work in these offices can in themselves be quite informative and are potential guest speakers when the classes get to the “Why the land cover has changed?”. Some of the types of local resources are:

Zoning boards or planning commissions
Historical Societies
State Departments of Natural Resources and Parks
Assorted *environmental organization?*

Data Collection

- **LANDSAT THEMATIC MAPPER (TM) IMAGES**

The primary reason the Land Cover Change Detection protocol asks that you join the GLOBE program is that the task of acquiring the 512 X 512 pixel Landsat TM images of your school and surrounding area is expensive. All you the teacher or school have to provide is the absolute location of your school. Globe will provide an image free of charge when you join GLOBE. Not to mention, GLOBE will also help you acquire the older Landsat TM image with a few conditions.

When your school joins the GLOBE program and have a teacher trained, Globe will send a floppy disk with copy of a current (as close as possible to the present date) Landsat TM image. This image will cover a 15 km X 15 km area and most likely your school will be centered in the image.

In order to complete the Land Cover Change Detection protocol you will need another georeferenced Landsat TM image (an image that has the same latitude and longitude coordinates as another image (**insert diagram**), in this case it will be georeferenced to the first GLOBE Landsat TM image.) The GLOBE program has agreed to provide schools with an older, around 1982, Landsat TM image georeferenced to the one they have already provided. All that they ask is that Land cover protocols be completed and the data entered on to the data entry web page. Once they see that you have completed these tasks, they are more than willing to go above and beyond for your school.

- **OLD AERIAL PHOTOGRAHS**

Write a request using the web ordering form/template to the National Archives (NARA) at College Park, Cartographic Branch for the oldest aerial photographs for your entire Landsat image. In addition to the text request for the oldest image, the NARA requires a detailed map of the Landsat image area. The detailed map should have a square drawn on the map to show the request area. The map needs to be sent to the NARA at College Park along with a copy of the request. The address is:

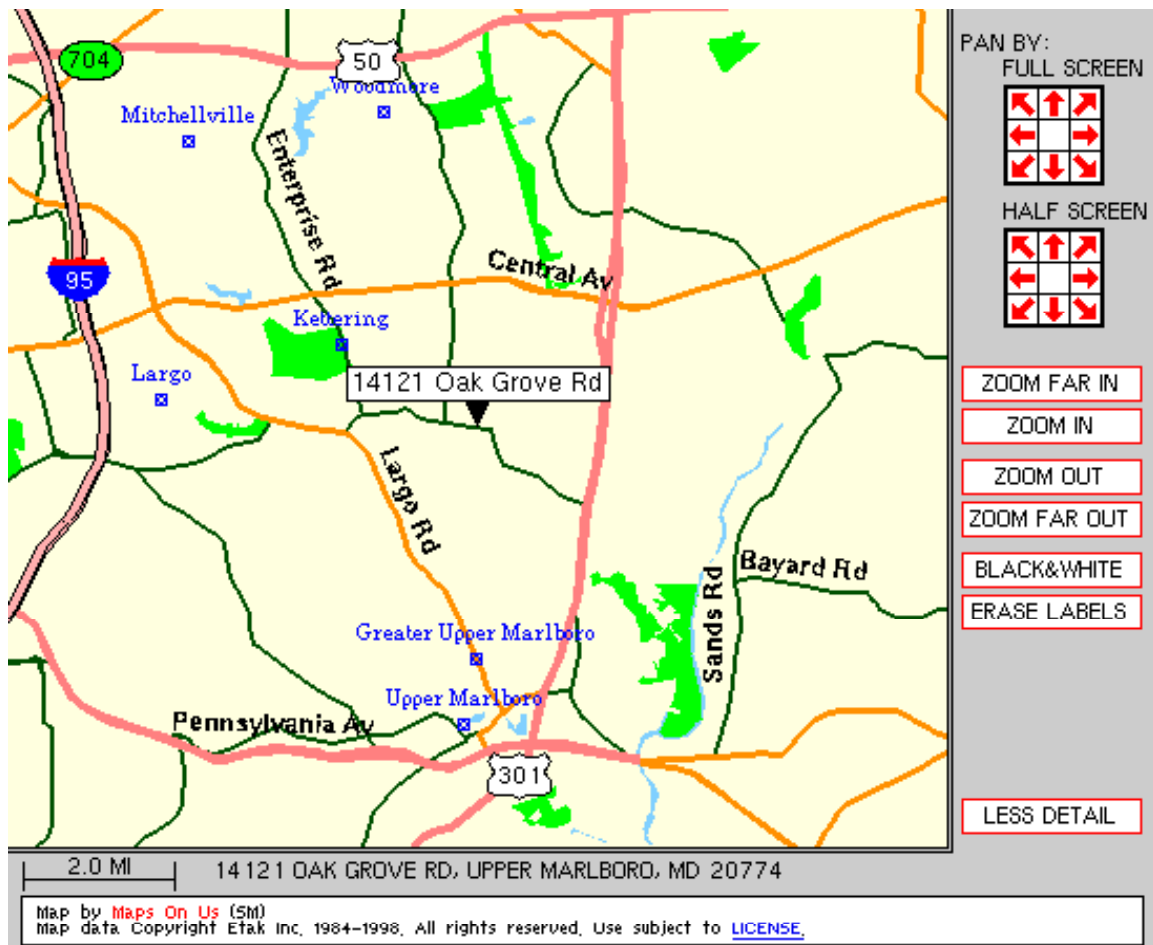
National Archives at College Park, Cartographic Branch

8601 Adelphi Road

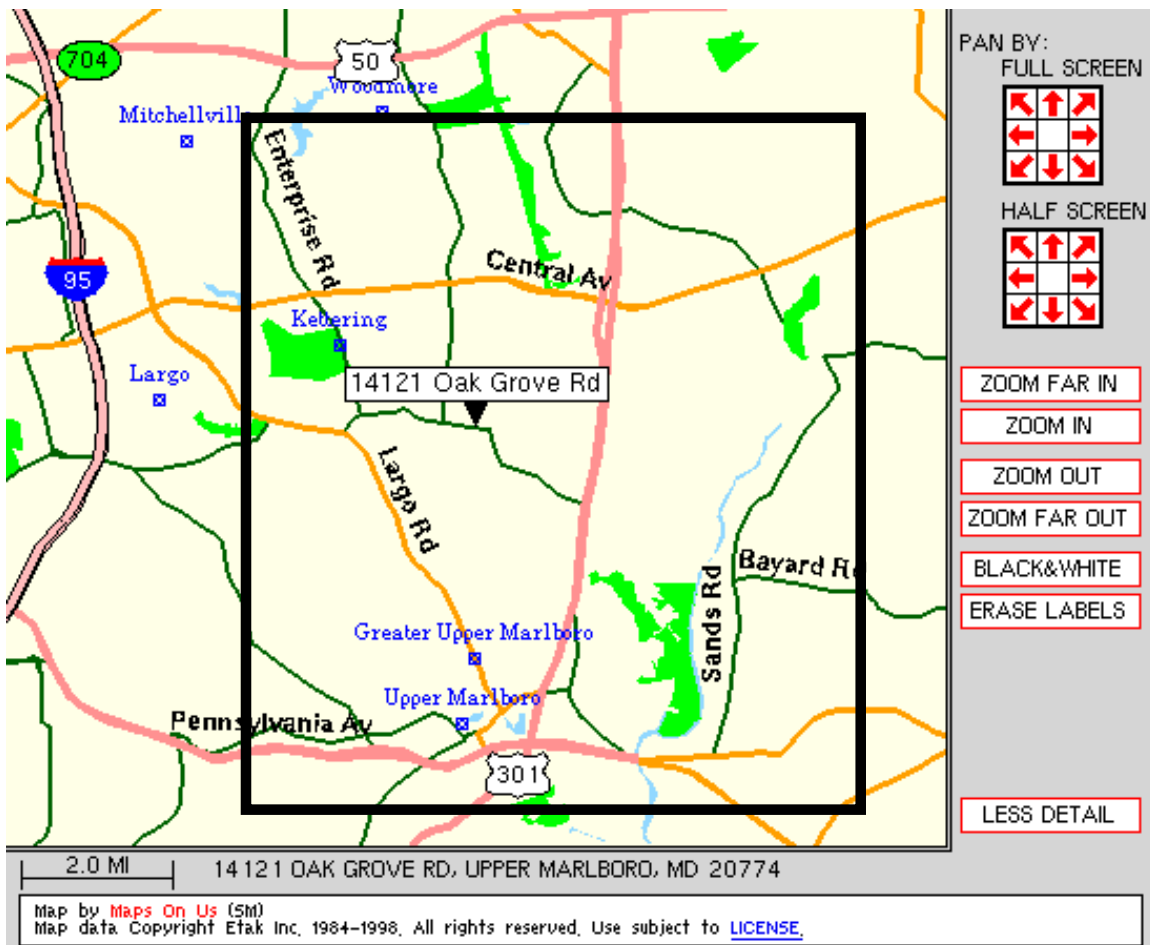
College Park, MD 20740-6001

A photo copied county map zoomed in to the study area is one way to create the Landsat image area map.

Another way to generate the map is through the MapsOnUs (**link <http://www6.MapsOnUs.com/>**) web site. Once at the home page select the the maps link. Then enter the schools address and draw the map. The map will be displayed in too much detail, so select the zoom out feature and set the scale to 2.0 MI ???, then redraw the map.



This map should have the entire area of the landsat image within it. Once the map is properly centered and to the proper scale if you select the image (pc- right click the mouse on the image and select “save this image as...”. mac- click and hold the mouse on the image and select “save this image as...”) Next thing to do is locate the four corners of the Landsat coverage perimeter on the MapOnUs map. This will be covered in the GLOBE Landsat image coverage area perimeter Learning activity. Once the four corners of the square are located, draw the perimeter with a software program: Word or any simple drawing program can create the Landsat image coverage perimeter. The larger the line thickness is the easier the NARA technician will be able to read the map and using the “draw a rectangle” function in the draw program will make a cleaner perimeter.



Now you can attach the map to the email request that will be generated.

An interesting Learning Activity is how to create the GLOBE Landsat image coverage area perimeter

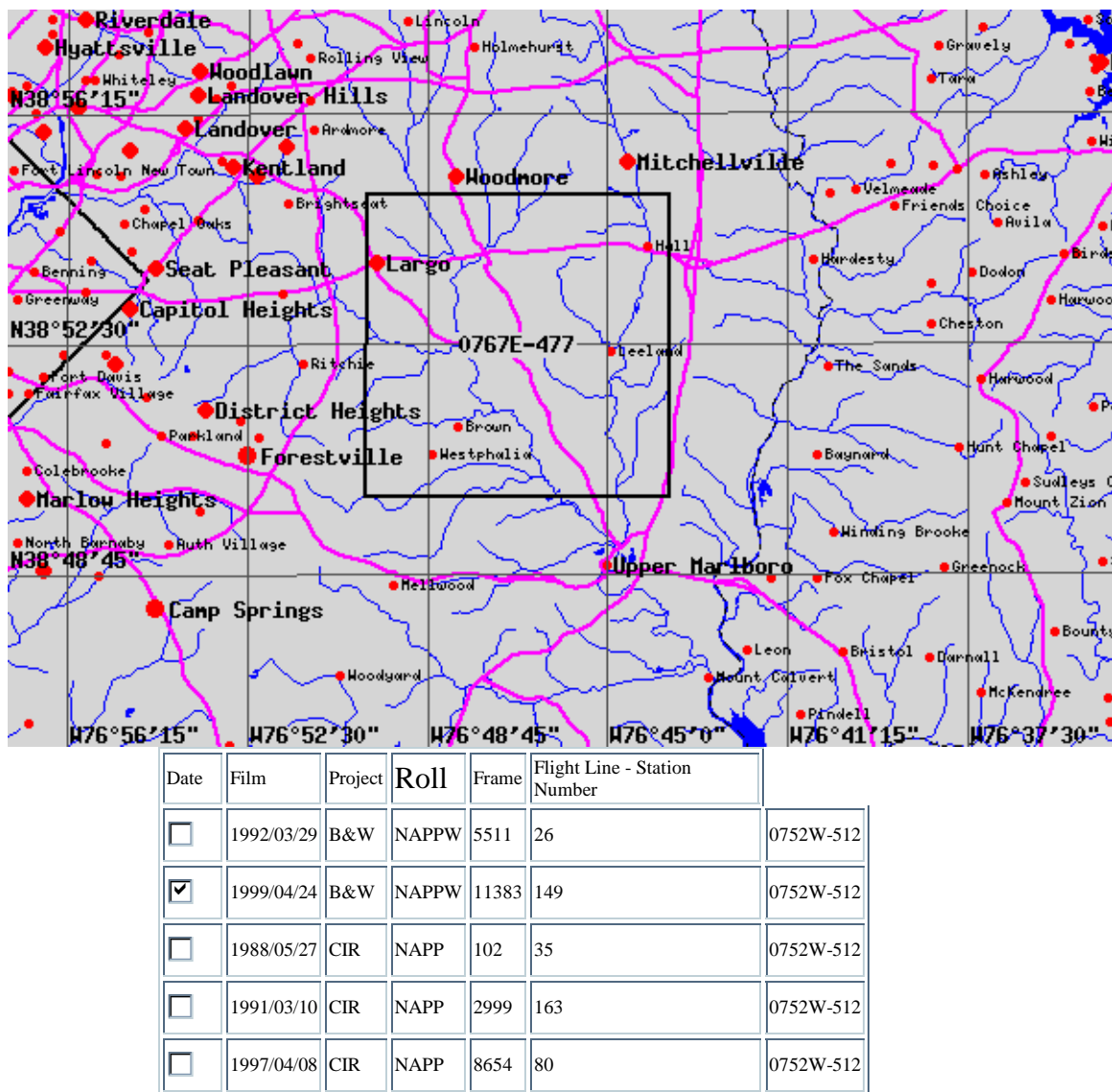
Chances are that one or two photographs will not completely cover your Landsat image area. If the number of images and their individual costs are too great, then using your Landsat image try and find a few areas where significant change may have occurred. Trying to predict where change may have occurred can be an interesting subject to explore with the students.

They will send you a response of what photographs they have available. Once you have this form you can order the photographs you selected and choose the size of the image (the larger the size the greater the cost.) A 10X10 aerial photograph costs approximately \$13.50 *without* sales tax, postage and handling, and the NARA handling fee. A 30X30 aerial photograph costs approximately \$39.00

- **AERIAL PHOTOGRAPHS**

Obtain the USGS quadrangle names that completely cover the Landsat image area from the web site [PHOTOFINDER](#). The easiest way to use the “Click on a Map” feature to locate your coverage area. Follow the very easy to use maps until

you get to the Image Map that has the following header, “Each one of the black dots shown in the map below represents a NAPP photo. Click on a dot to see the coverage area of the photo and a list of the photographs available for that area.” When you find your schools coverage area on the map, click on the appropriate dot. The two below figures show the final aerial photograph coverage map and the table of available photographs.



“The rectangle shows the area that is covered by the photograph. The items listed below show the photographs for this area that were taken at different times or with a different film type. To place an order, click on the button next to one of the items listed below, then click on Add to Shopping Basket. If there is only one item listed, you must still click on the order button before clicking on Add to Shopping Basket. To view the shopping basket, to finalize your order, or to change something in the shopping basket, click on View Shopping Basket.”

Once the appropriate image is selected, (remember that the 9-INCH BLACK ANDS WHITE PRINTS are recommended) you can customize your selection with the product and media type (size of the image ranging from 9-INCH BLACK ANDS WHITE PRINT \$10.00 EACH to 36-BLACK AND WHITE PRINT \$33.00 EACH.) When everything is selected properly you can complete the order form and schedule the easiest form of payment within the given time frame. Below are the final instructions to help plan the payment and budget considerations in your planning.

“INSTRUCTIONS:

To complete your order and submit it for processing, fill out the address information (you must include your name, address, daytime phone number, and email address) and click on the "Submit Order" button. To expedite your order, please contact Customer Services at 1-800-252-GLIS (8am-4pm CST) to verify your order and arrange payment. If we do not hear from you within three working days, a Customer Services representative will contact you by email or phone to arrange payment. You can also place orders by contacting a Customer Services representative directly by calling 1-800-252-GLIS or by sending email to custserv@edcmail.cr.usgs.gov .”

- **Topographic Maps**

Obtain the USGS quadrangle names that completely cover the Landsat image area from the web site [MAPFINDER](#). Follow the same steps as PHOTOFINDER to order the topographic maps.

- **Farm Service Agency- Aerial Photographs**

The Farm Service Agency (FSA) flies their own aerial photograph program over rural areas. To locate the local office of the FSA they have an excellent web site that will give the closest branch information.

[Office locator](#)

[Aerial photographs](#)

When you go into the local office the aerial photographs are color slides. You can select a series of slides of your site from various years dating back to 1980. The easiest and best way to copy the color slides is to have them copied on to a Kodak Digital Science™ Photo CD master disc. This will allow you to manipulate the zoom, contrast, color and detail similar to a TM image. A high quality desk jet printer will print these images with enough detail for easy use.

